CHAPTER III

SUMMARY OF TROPICAL CYCLONES OF 1962

A. GENERAL

A record year for typhoons has gone into the climatology books. This year, 24 typhoons crossed the Western Pacific, which exceeds the record of 21 typhoons per year that occurred last in 1952. For additional comparisons, see the following Typhoon Distribution by Month Table.

The FWC analyzed and numbered, for internal record purposes, 78 major easterly waves. Of this number, 42 had embedded or junction vortices that had the potential of possible development and were designated as cyclones by JTWC. Of these 42 cyclones, 21 developed to typhoon intensity, 3 developed to tropical storm intensity, and 7 required tropical depression warnings. Complementary to these 42 cyclones, there were 14 cyclones designated by JTWC that were not definitely related to major easterly waves. Of this number, 3 reached typhoon intensity, 3 became tropical storms, and 2 required tropical depression warnings.

The following data for the JTWC area of responsibility is presented for comparison purposes:

COMPARATIVE WESTERN PACIFIC TROPICAL CYCLONE DATA

	1959	1960	1961	1962
TOTAL NUMBER OF WARNINGS	583	776	738	815
CALENDAR DAYS OF WARNINGS	137	157	165	154
MAJOR EASTERLY WAVES	--	--	--	78
SUSPECT CYCLONES	32	26	27	17
TROPICAL DEPRESSIONS	7	3	11	9
TROPICAL STORMS	9	8	11	6
TYPHOONS	17	19	20	24
TOTAL TROPICAL CYCLONES	65	56	69	56

In the area of responsibility of the Joint Hurricane Warning Center, Hawaii, (North Pacific between 140W and 180°) there were two cyclones, and both required tropical depression warnings.

On the following pages are the 1962 Typhoon Data Summary Charts. The 1962 average typhoon is represented by

TYPHOON DISTRIBUTION BY MONTH

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOT
1953		1			1	1	1	5	2	4	1	1	17
1954					1		1	4	4	2	3		15
1955	1		1	1		1	5	3	3	2	1	1	19
1956			1	1			2	4	5	1	3	1	18
1957	1			1	1	1	1	2	5	3	3		18
1958	1				1	2	5	3	3	3	1	1	20
1959				1			1	5	3	3	2	2	17
1960				1		2	2	8		4	1	1	19
1961			1		2	1	3	3	5	3	1	1	20
1962				1	2		5	7	2	4	3		24
AVG.	.3	.1	.3	.6	.8	.8	2.6	4.4	3.2	2.9	1.9	.8	18.7

1962 TYPHOON DATA SUMMARY

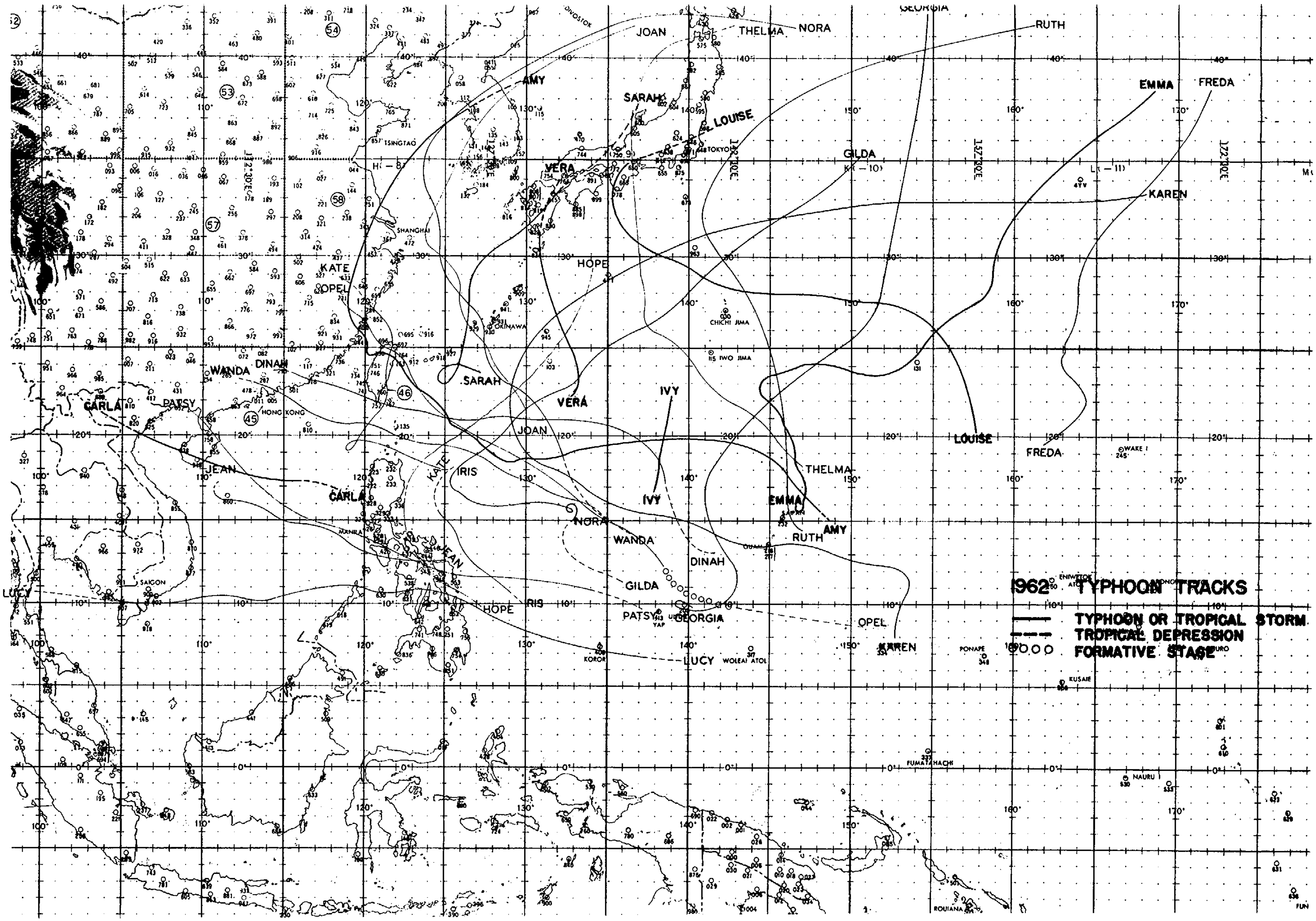
TYPHOON	MONTH	MAX SFC WND SPD	CALENDAR DAYS OF WARNINGS/TYPHOON		DISTANCE TRAVELED WARNING STATUS
GEORGIA	APR	130	7.50	5.75	2472
HOPE	MAY	85	6.25	1.75	1566
IRIS	MAY	65	3.75	.25	630
JOAN	JUL	80	4.00	1.75	1614
KATE	JUL	85	5.50	2.75	1050
LOUISE	JUL	80	8.00	5.25	1962
NORA	JUL	75	8.75	3.00	2622
OPEL	JUL	150	6.25	4.00	2310
PATSY	AUG	65	5.00	1.50	1848
RUTH	AUG	160	9.00	8.00	2316
SARAH	AUG	75	7.50	4.00	1320
THELMA	AUG	120	6.25	3.25	1824
VERA	AUG	75	3.00	1.25	756
WANDA	AUG	95	5.25	3.25	1434
AMY	AUG	140	9.75	6.25	2964
CARLA	SEP	75	4.00	0.25	858
DINAH	SEP	100	9.00	3.50	1860
EMMA	OCT	145	9.75	9.50	2232
FREDA	OCT	100	6.75	5.25	1380
GILDA	OCT	115	11.50	7.25	2706
IVY	OCT	100	1.50	1.00	342
JEAN	NOV	90	6.25	3.25	948
KAREN	NOV	160	10.25	9.50	4176
LUCY	NOV	100	6.75	3.50	2400
TYPHOON	AVG	105	6.75	4.00	1816

1962 TYPHOON DATA SUMMARY

TYPHOON	MONTH	MAX VERT DVLPMENT	FROM RECONNAISSANCE MAX 700MB TEMP (C)	MIN 700MB HGT	MIN 850MB HGT	MIN SLP (MB)
GEORGIA	APR	35000	22	8210	3090	936
HOPE	MAY	25000	20	9530	4285	978
IRIS	MAY	35000	21	10000	4775	991
JOAN	JUL	30000	17	9770	4555	985
KATE	JUL	35000	19	9060	3840	964
LOUISE	JUL	30000	18	9000	3750	958
NORA	JUL	30000	17	9340	4090	968
OPEL	JUL	35000	26	7590	1980	910
PATSY	AUG	30000	16	9900	4510	980
RUTH	AUG	45000	25	7830	2005	916
SARAH	AUG	30000	19	9480	4260	978
THELMA	AUG	35000	22	8540	3865	946
VERA	AUG	30000	16	9730	4455	983
WANDA	AUG	35000	17	8840	3500	949
AMY	AUG	40000	20	8210	2730	935
CARLA	SEP	30000	15	9650	4400	983
DINAH	SEP	35000	21	8880	3580	953
EMMA	OCT	40000	26	7070	1925	903
FREDA	OCT	30000	21	8730	3435	948
GILDA	OCT	30000	24	8700	3275	933
IVY	OCT	25000	17	10130	4860	997
JEAN	NOV	25000	15	9380	3940	960
KAREN	NOV	45000	24	7220	1900	897
LUCY	NOV	30000	19	9340	3830	974
TYPHOON	AVG	32900	20	8920	3620	955

1962 TYPHOON DATA SUMMARY

TYPHOON	MONTH	FROM WARNINGS MAX RADIUS 100 KT WND	 MAX RADIUS 50 KT WND	 MAX RADIUS 30 KT WND
GEORGIA	APR	75	300	1000
HOPE	MAY	--	50	150
IRIS	MAY	--	25	100
JOAN	JUL	--	200	300
KATE	JUL	--	100	500
LOUISE	JUL	--	150	300
NORA	JUL	--	250	600
OPEL	JUL	30	200	450
PATSY	AUG	--	150	300
RUTH	AUG	50	150	350
SARAH	AUG	20	75	200
THELMA	AUG	20	75	150
VERA	AUG	--	50	100
WANDA	AUG	--	175	400
AMY	AUG	80	250	400
CARLA	SEP	--	50	150
DINAH	SEP	--	300	500
EMMA	OCT	40	300	750
FREDA	OCT	--	150	400
GILDA	OCT	30	175	600
IVY	OCT	--	75	150
JEAN	NOV	--	75	600
KAREN	NOV	50	250	600
LUCY	NOV	25	125	900


1962 TYPHOON TRACKS
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
AMY
CARLA
DINAH
EMMA
FREDA
GEORGIA
GILDA
HOPE
IRIS
IVY
JEAN
JOAN
KAREN
KATE
LOUISE
LUCY
NORA
OPEL
PATSY
RUTH
SARAH
THELMA
VERA
WANDA
SHANGHAI
TSINGTAO
HONG KONG
MANILA
SAIGON
OKINAWA
TOKYO
CHICHI JIMA
IWO JIMA
GUAM
SAIPAN
YAP
KOROR
WOLEAI ATOL
PONAPE
KUSAIE
NAURU
WAKE I
ENIWETOK
FUMATAHACHI

1962 TYPHOON TRACKS

TYPHOON GEORGIA	16 APR - 24 APR
TYPHOON HOPE	16 MAY - 22 MAY
TYPHOON IRIS	26 MAY - 30 MAY
TYPHOON JOAN	07 JUL - 11 JUL
TYPHOON KATE	18 JUL - 24 JUL
TYPHOON LOUISE	20 JUL - 28 JUL
TYPHOON NORA	26 JUL - 04 AUG
TYPHOON OPEL	30 JUL - 06 AUG
TYPHOON PATSY	06 AUG - 11 AUG
TYPHOON RUTH	13 AUG - 22 AUG
TYPHOON SARAH	15 AUG - 22 AUG
TYPHOON THELMA	21 AUG - 27 AUG
TYPHOON VERA	25 AUG - 28 AUG
TYPHOON WANDA	27 AUG - 01 SEP
TYPHOON AMY	29 AUG - 08 SEP
TYPHOON CARLA	19 SEP - 23 SEP
TYPHOON DINAH	25 SEP - 04 OCT
TYPHOON EMMA	01 OCT - 11 OCT
TYPHOON FREDA	03 OCT - 10 OCT
TYPHOON GILDA	19 OCT - 30 OCT
TYPHOON IVY	28 OCT - 29 OCT
TYPHOON JEAN	06 NOV - 12 NOV
TYPHOON KAREN	07 NOV - 18 NOV
TYPHOON LUCY	25 NOV - 01 DEC

the data at the bottom of the first two charts. This data has been rounded off to the nearest values used locally to depict the actual typhoons.

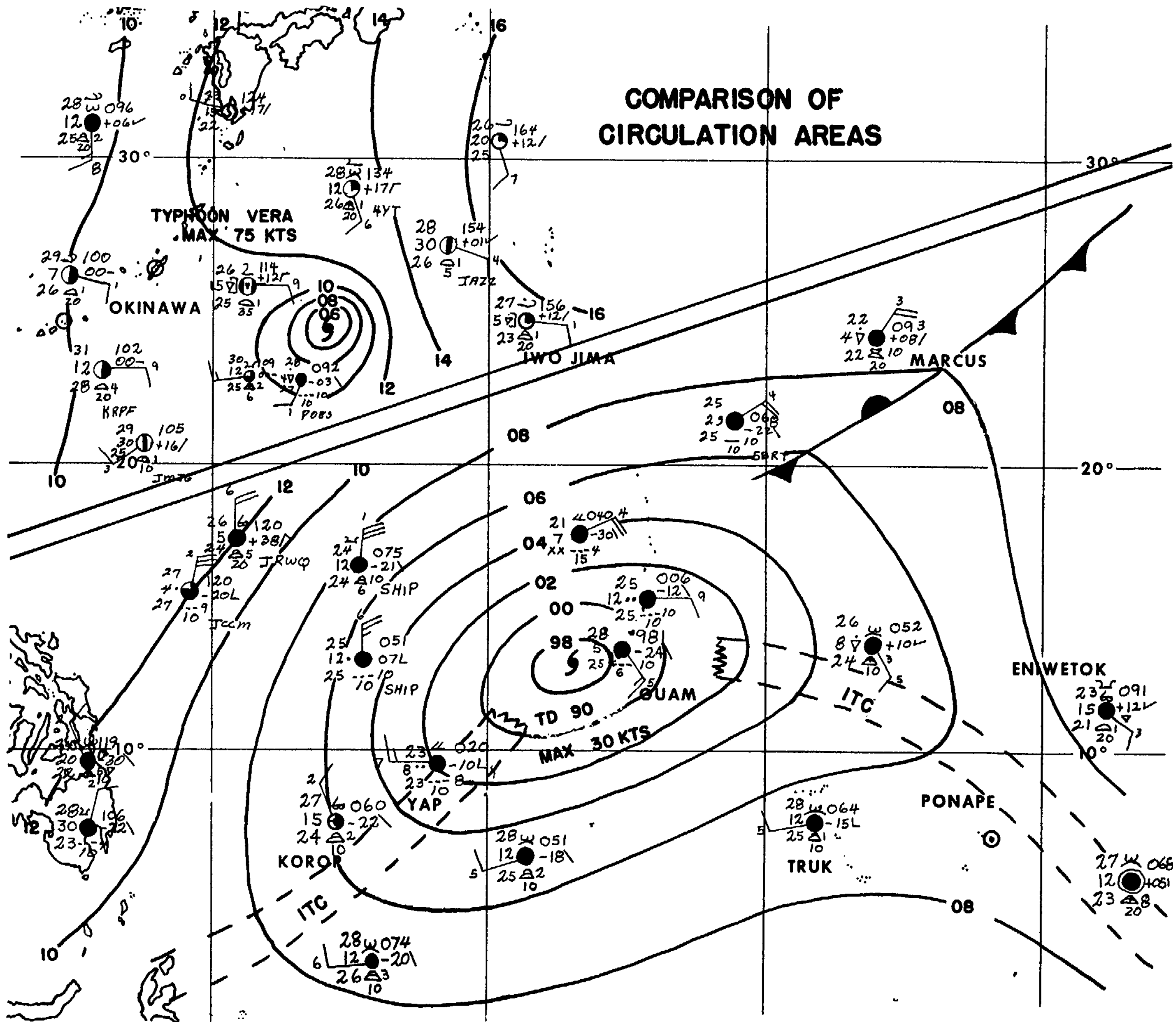
The 6 tropical storms were FRAN (Feb), MARGE (Jul), BABE (Sep), HARRIET (Oct), MARY and NADINE (Dec). For more information on tropical storms and tropical depressions, see Tropical Depressions and Tropical Storms of 1962 and pages following at the end of this chapter.

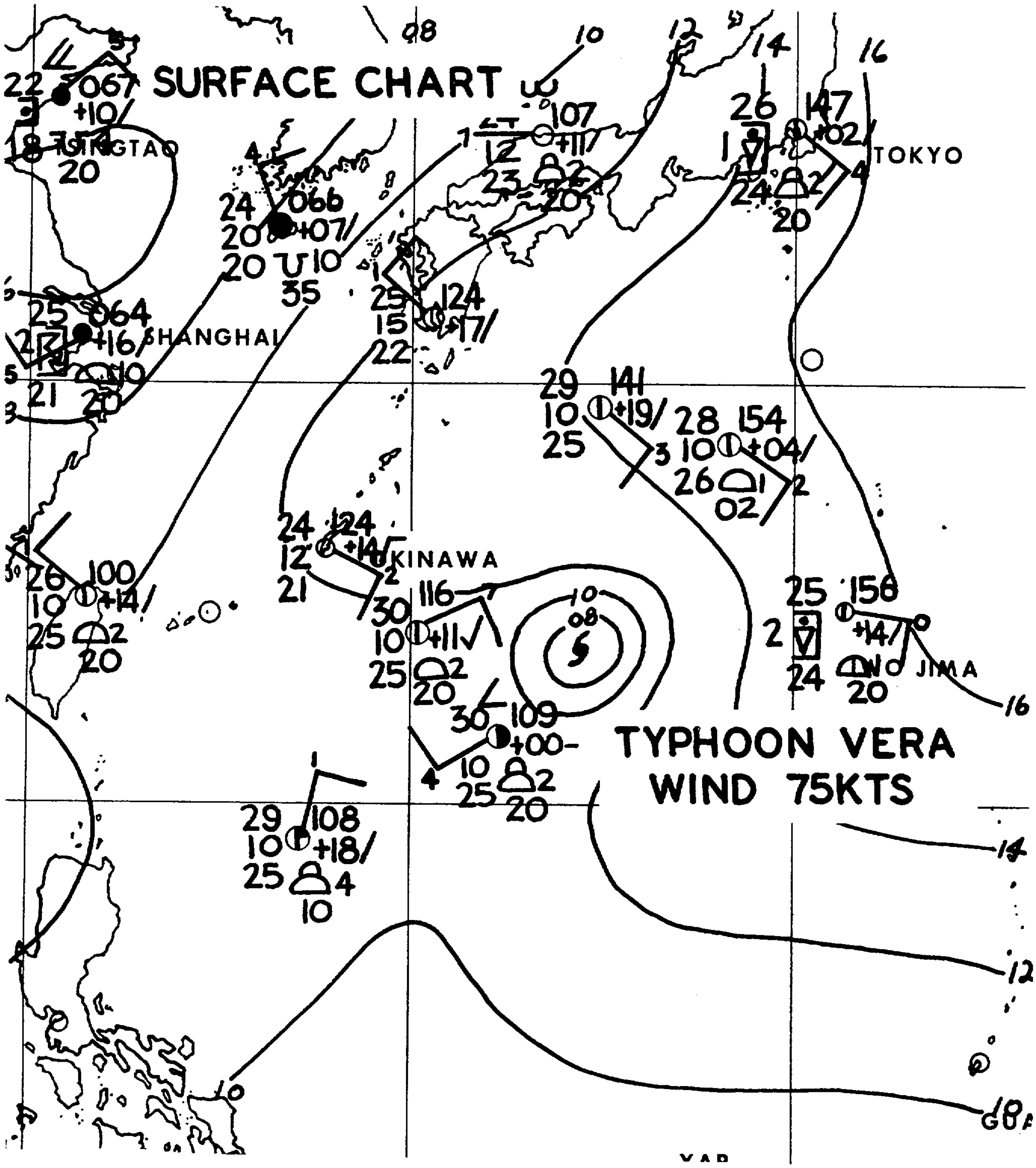
The circulation area of a tropical cyclone will differ from system to system. Thus, it is sometimes observed that the circulation area of a tropical depression is greater than that of a typhoon. Such an occurrence is depicted on the following Comparison of Circulation Areas chart. The wind speed of a cyclone is not necessarily proportional to the circulation area but, in general, is proportional to the pressure gradient. Evidence of the above is readily apparent in the following three charts of Typhoons VERA, WANDA and NORA when they all had a maximum wind speed of 75 kts.

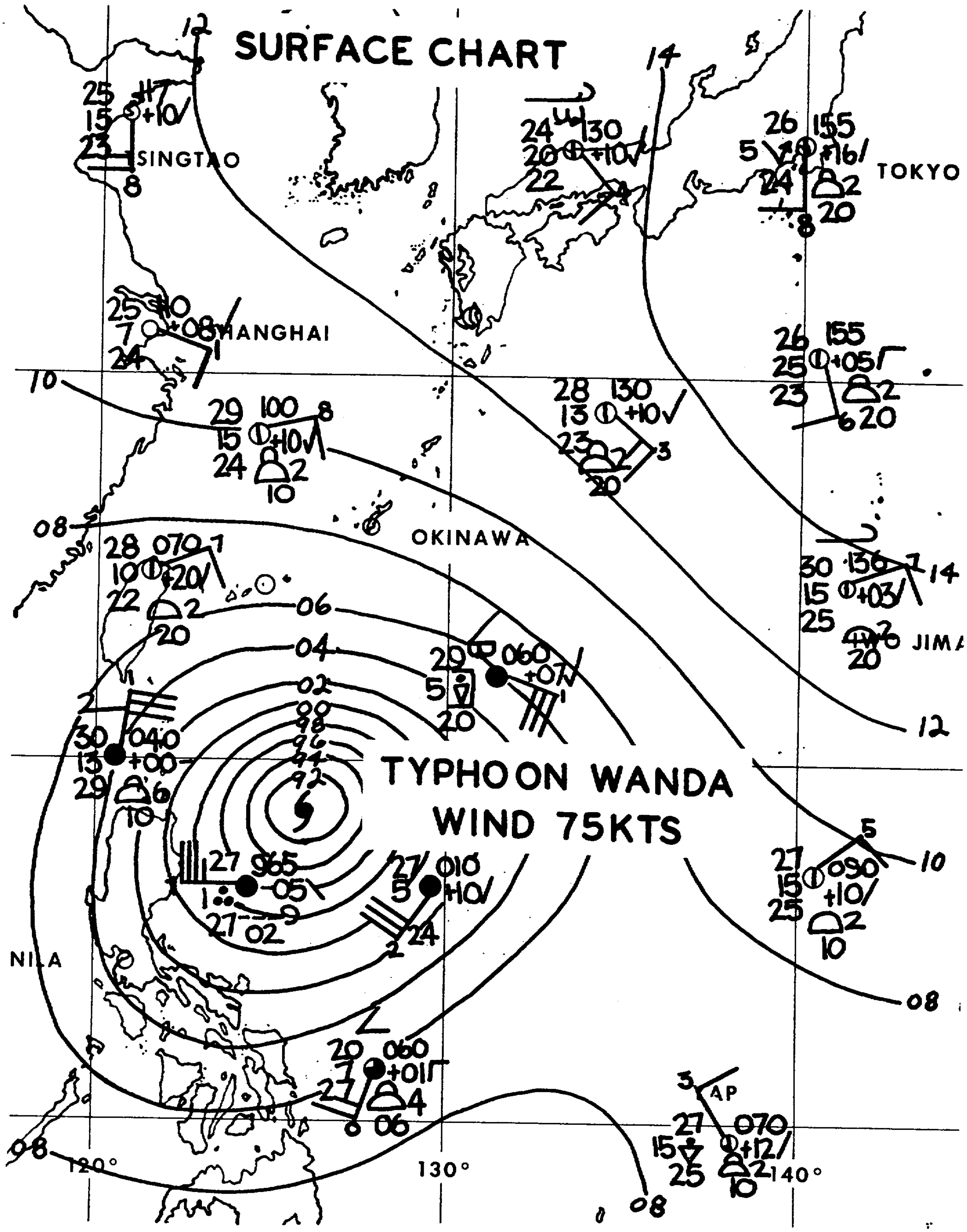
B. DEVELOPMENT

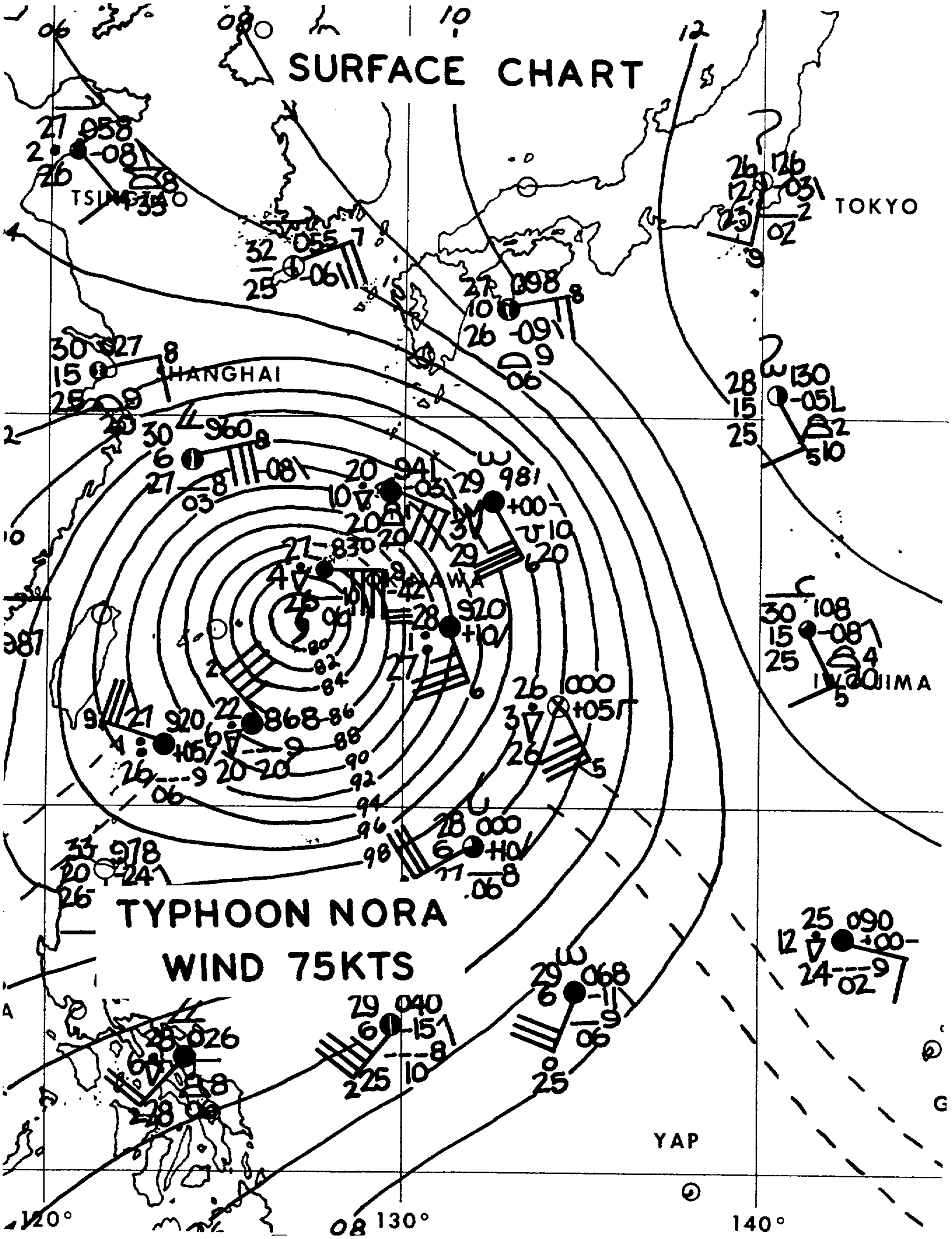
For development to take place, there must be a pre-existing surface perturbation and a large increase of divergence aloft to provide the "kick" to start the "heat engine." Once the heat engine is started, it must have, on a continuing basis, enough divergence aloft to balance the convergence in the low levels or the typhoon will stall out and dissipate (i.e., Typhoons IRIS, JEAN and LUCY). In extreme cases, after initial development, the vortex will be kept in a low state of development for an extended period of time by minimal divergence aloft before the divergence increases sufficiently for full development to take place (i.e., Typhoons OPEL, SARAH, and CARLA).

The apparent complement to these two criteria is the need for the energy level of the easterlies to be increased above normal. This additional energy is usually derived from the westerlies. Of the various methods of energy transfer into the easterlies that are possible, six were observed this season.


COMPARISON OF
CIRCULATION AREAS
TYPHOON VERA
MAX 75 KTS
OKINAWA
IWO JIMA
MARCUS
ENIWETOK
GUAM
TD 90
MAX 30 KTS
YAP
KOROR
TRUK
PONAPE
ITC
ITC
ITC


SURFACE CHART
TSINGTAO
SHANGHAI
OKINAWA
TOKYO
IWO JIMA
TYPHOON VERA
WIND 75KTS


SURFACE CHART
TSINGTAO
SHANGHAI
TOKYO
OKINAWA
TYPHOON WANDA
WIND 75KTS
120°
130°
140°


SURFACE CHART
TYPHOON NORA
WIND 75KTS
TSINGTAO
SHANGHAI
TOKYO
IWO JIMA
YAP
120°
130°
140°

Method I is the low level, below the 400mb level, polar trough and easterly wave interaction in the form of superposition and subsequent fracture (14) (i.e., Typhoons IRIS, JOAN and JEAN).

Method II is the high level, near the 200mb level, energy surge from the westerlies into the easterlies via the MPT (13) (i.e., Typhoons LOUISE, RUTH, AMY, CARLA, DINAH, FREDA, IVY and LUCY).

Method III is the same as Method II only without the MPT. (i.e., Typhoon EMMA).

Method IV is the crossequatorial surge into the 200mb easterlies (i.e., Typhoons GEORGIA and GILDA).

Method V is the high level polar trough-easterly trough interaction (i.e., Typhoon VERA).

Method VI is the MPT fracturing with the fractured extremity becoming an easterly trough (i.e., Typhoon THELMA).

In several cases, there were two energy transfers into the easterlies, though not necessarily at the same time, as follows:

Methods I and II (i.e., Typhoon KAREN)
Methods I and III (i.e., Typhoons KATE, NORA, OPEL and SARAH)
Methods I and IV (i.e., Typhoon HOPE)
Methods II and III (i.e., Typhoon PATSY)
Methods IV and V (i.e., Typhoon WANDA)

A few amplifying remarks are needed in the cases of Typhoons VERA and WANDA. In the case of VERA, there was a surge in the easterlies after the fracture, but the apparent source of the surge could not be determined. In the case of WANDA, the MPT was the polar trough.

Thus, of the 24 typhoons, 11 have histories involving the MPT, 8 have histories of low level polar trough-easterly wave interaction, 1 has a history involving the MPT and low level polar trough-easterly wave interaction, 1 has a history of high level polar trough-easterly trough interaction, and only 3 have histories not involving the MPT or polar trough-easterly wave (trough) interaction.

A good example of an upper level surge in the easterlies was observed at Yap just prior to the initial development of Typhoon PATSY and is as follows:

	031200Z	041200Z	051200Z
45,000 ft	33 kts	80 kts	34 kts
40,000 ft	24 kts	90 kts	27 kts
35,000 ft	25 kts	70 kts	16 kts

All of the initial surface vortices were either junction (i.e., GEORGIA, HOPE, IRIS, KATE, NORA, OPEL, PATSY, RUTH, WANDA, DINAH, FREDA, GILDA, IVY, JEAN and LUCY) or embedded in an easterly wave (i.e., JOAN, LOUISE, SARAH, THELMA, AMY and KAREN), except for those embedded in the ITC (i.e., VERA, CARLA and EMMA). The last three are believed to have initially been junction vortices with the easterly waves subsequently being absorbed in the flow of Typhoon THELMA, T.D. #66, and Typhoon DINAH, respectively. Lack of data prevents complete substantiation of this belief with these cases, but this belief is verified in the case of Typhoon IVY which formed in the wake of Typhoon GILDA.

Of the six cases classified as embedded in an easterly wave, four came from easterly waves that had simultaneously embedded and junction vortices; however, the embedded vortices subsequently became dominate and absorbed the junction vortices (i.e., JOAN, LOUISE, THELMA and AMY).

Most of the vortices had their initial development under the SE quadrant of the zenith 200mb outdraft. The next most prevalent for development was the SW quadrant (i.e., Typhoons GEORGIA, HOPE, IRIS, DINAH and GILDA). One had its initial development under the NE quadrant (i.e., AMY). There were two under the influence of the NE quadrants of Southern Hemisphere outdrafts (i.e., WANDA and KAREN), which are equivalent to the flow of the SW quadrants of Northern Hemisphere outdrafts.

C. STEERING

Steering of the typhoon is not provided by any one pressure surface, but is the integrated effect of the whole atmosphere of which the typhoon is embedded. However, the changes on one pressure surface are reflected both up and down, and thus a particular pressure surface may be considered as representative of a finite layer of the atmosphere.

What pressure surface is best to use as a guide for steering? Each typhoon is an entity in itself, but in general it was observed this year that the best steering level was five to ten thousand feet below the maximum vertical extent of the storm at the time of consideration. The best example of this is Typhoon RUTH.

RUTH rapidly developed a closed cyclonic circulation through the 300mb level, and throughout her life the 300mb in conjunction with the 200mb gave the best indication of her course. The rapid veering SSE of Saipan was the result of the reorientation of the MPT to the N of the storm and the development of an upper level high pressure cell NW of Iwo Jima with extensive ridging to the SSE. RUTH established her closed cyclonic winds through the 200mb level after 161200Z and kept this extensive vertical development until 211200Z when she became a trough on this level. Her approximate point of recurvature was indicated 48 hours in advance by the 200mb flow. The 300mb was better than the 200mb for predicting her course from 12 hours prior to recurvature and on through the recurvature phase. On the 300mb level, a high pressure cell moved to the E until it was just N of Tokyo, while the high pressure cell near station ship 4YV went S, allowing RUTH to pick up the upper level trough and continue her recurvature.

The subtropical ridge axis on the 700mb and 500mb levels moved rather steadily northward from 111200Z to 190000Z; it moved from approximately 600 mi S to 120 mi N of Tokyo. After 190000Z, the 700mb and 500mb ridge to the N of the storm started dissipating while extensive ridging commenced from the general area of station ship 4YV until a new high pressure cell formed to the S of RUTH. The subtropical ridge then re-established itself in the approximate position it had at 111200Z, as RUTH churned off into the N portion of the North Pacific Ocean.

Thus, by using the upper levels for primary steering considerations, the JTWC forecasters never forecast a land strike on Japan by Typhoon RUTH.

Typhoons move W or S of W only with an abnormally strong subtropical ridge. The N component of movement is directly related to the weakness of the ridge on the steering level. Typhoons may make a pass at a short wave trough, depending upon the latitudinal distance S of the ridge axis and the strength of the short wave trough, but they will recurve into a long wave trough. Thus, the forecast of recurvature is very critical and involves an accurate direction and speed of movement of the typhoon, long wave and ridge axis in conjunction with the amplitude changes of the long wave and ridge.

An interesting feature of all the non-recurvers this year is that the 500mb was the level that gave the best indication of acting as the steering level for the majority of the length of all the tracks. Usually the larger the typhoon's circulation or the lower the surface pressure, the more difficult the job is of separating the undisturbed steering flow from the typhoon-induced changes. Thus, in general, the 500mb level works best as a steering level when the horizontal extent of the circulation is small or nonexistent on the 300mb level. The best example of this is Typhoon PATSY.

Based on the available data, it is doubtful that PATSY ever extended her closed cyclonic circulation above the 300mb level. The 500mb flow at 060000Z indicated that PATSY would follow in Typhoon OPEL's wake and skirt the eastern side of the Philippines and cross Taiwan before going inland. However, rapid ridging extended SW from the high pressure cell NW of Iwo Jima, and by 070000Z the subtropical ridge was re-established to the SE corner of the Tibetan Plateau. By 071200Z, the 500mb streamline flow ahead of PATSY indicated her course almost to the exact oscillations. In this area, no further major meteorological changes occurred, and the 500mb flow was only disturbed by the flow induced by PATSY. This is the ideal situation and one in which a pressure surface can most easily be used for steering indication.

No one pressure surface is used by the forecasters of JTWC to forecast the course of a typhoon; but in postanalysis, for comparison's sake, the one pressure surface that would have come the closest to predicting the best track in the three phases of movement (pre-recurvature, recurvature, and post-recurvature) was selected for each phase. The Best Steering Levels and Final Disposition chart is presented in lieu of further narration on the subject.

D. DISSIPATION

Complete dissipation is caused by one of two events (or in conjunction with one another): the first is the source of energy (the ocean) being cut off (i.e., large land strike relative to the horizontal extent of the circulation), and the second is the loss of the required minimum divergence aloft. The injection of cold air will lessen the intensity and change the character of the storm from tropical to extratropical with the subsequent possibility of regeneration as an extratropical storm. The final disposition of the typhoons is presented in the Best Steering Levels and Final Disposition chart. FREDA made the newspapers even in her extratropical condition when she crossed into the northwestern portion of the United States on 13 October.

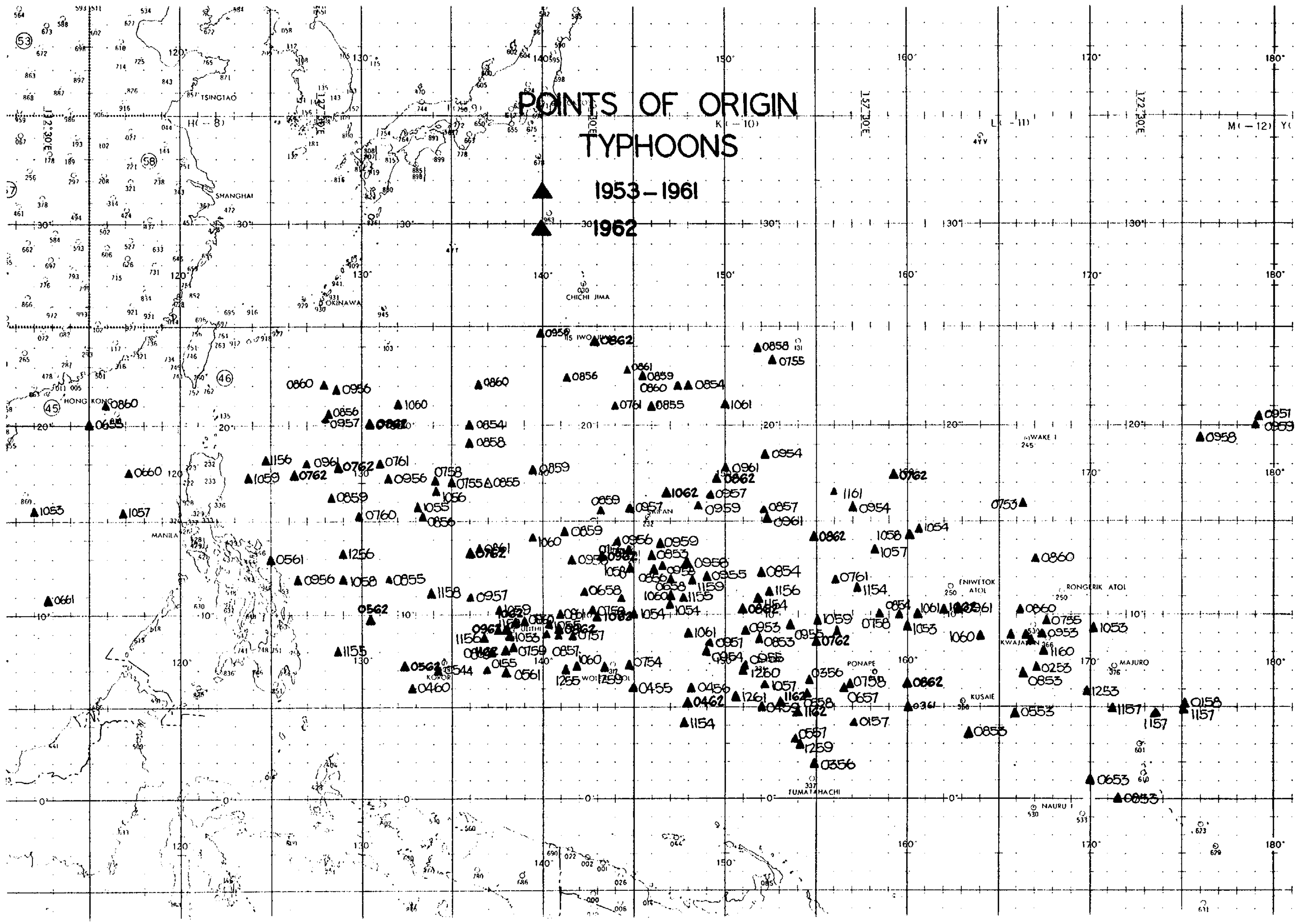
E. DAMAGE

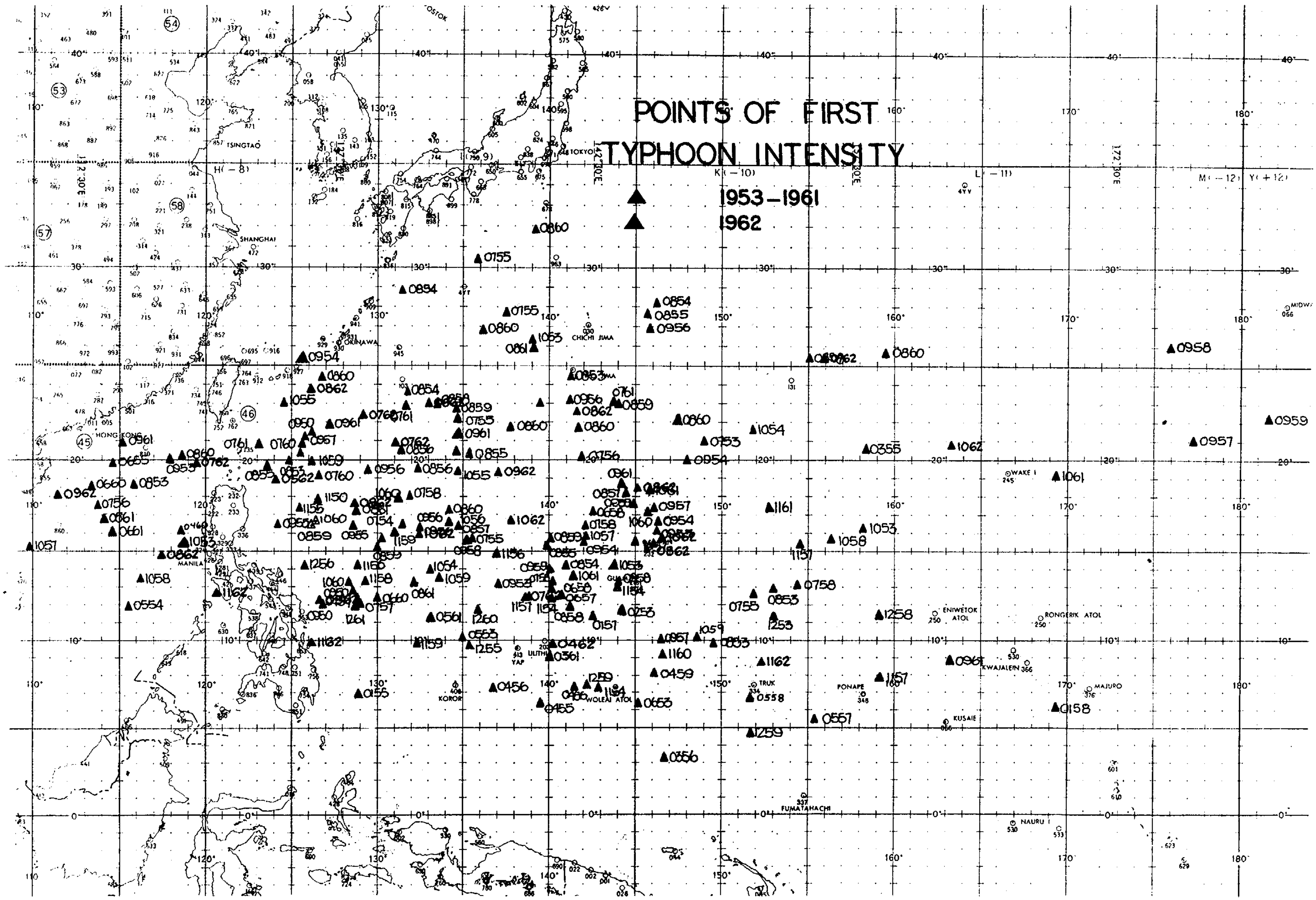
The actual total loss of life and property caused by tropical cyclones of the Western Pacific in 1962 is not known. However, to date, at least 1700 persons are known dead, and over $325,000,000 worth of property has been damaged or destroyed.

BEST STEERING LEVELS AND FINAL DISPOSITIONS

NAME	MAX WND	MAX VERTICAL DVLPMENT	RECURVATURE PRIOR	DURING	AFTER	DISSIPATION LAND STRIKE	LACK OF DIV. ALOFT	EXTRA-TROPICAL
SARAH	75	30,000	2	2	2			X
KAREN	160	45,000	2	2	3			X
RUTH	160	45,000	2	3	3			X
EMMA	145	40,000	3	3	3			X
AMY	140	40,000	3	5	5			X
GEORGIA	130	35,000	5	3	5			X
THELMA	120	35,000	5	5	5			X
GILDA	115	30,000	5	5	5			X
FREDA	100	30,000	5	5	5			X
HOPE	85	25,000	5	5	5			X
JOAN	80	30,000	5	5	7			X
NORA	75	30,000	5	5	7			X
*OPEL	150	35,000	5	NA	NA			X
KATE	85	35,000	5	5	5	X		
LOUISE	80	30,000	5	3	7	X		
VERA	75	30,000	5	5	5	X		
IVY	100	25,000	NA	NA	5		ABSORBED	
IRIS	65	35,000	5	5	NA		X	
LUCY	100	30,000	5	NA	NA		X	
JEAN	90	25,000	5	NA	NA		X	
DINAH	100	35,000	5	NA	NA	X		
WANDA	95	35,000	5	NA	NA	X		
CARLA	75	30,000	5	NA	NA	X		
PATSY	65	30,000	5	NA	NA	X		

*Recurved after becoming extratropical. NOTE: Numbers indicate 100's of MB levels.


POINTS OF ORIGIN
TYPHOONS
1953-1961
1962
HONG KONG
MANILA
SHANGHAI
TSINGTAO
OKINAWA
CHICHI JIMA
WAKE I
ENIWETOK ATOL
RONGERIK ATOL
KWAJALEIN
MAJURO
PONAPE
KUSAIE
NAURU I
KOROR


POINTS OF FIRST
TYPHOON INTENSITY
1953-1961
1962
TOKYO
SHANGHAI
TSINGTAO
HONG KONG
MANILA
OKINAWA
CHICHI JIMA
YAP
ULITHI
KOROR
WOLEAI ATOL
TRUK
PONAPE
KUSAIE
KWAJALEIN
ENIWETOK ATOL
RONGERIK ATOL
MAJURO
WAKE I
NAURU I

TROPICAL CYCLONES OF 1962

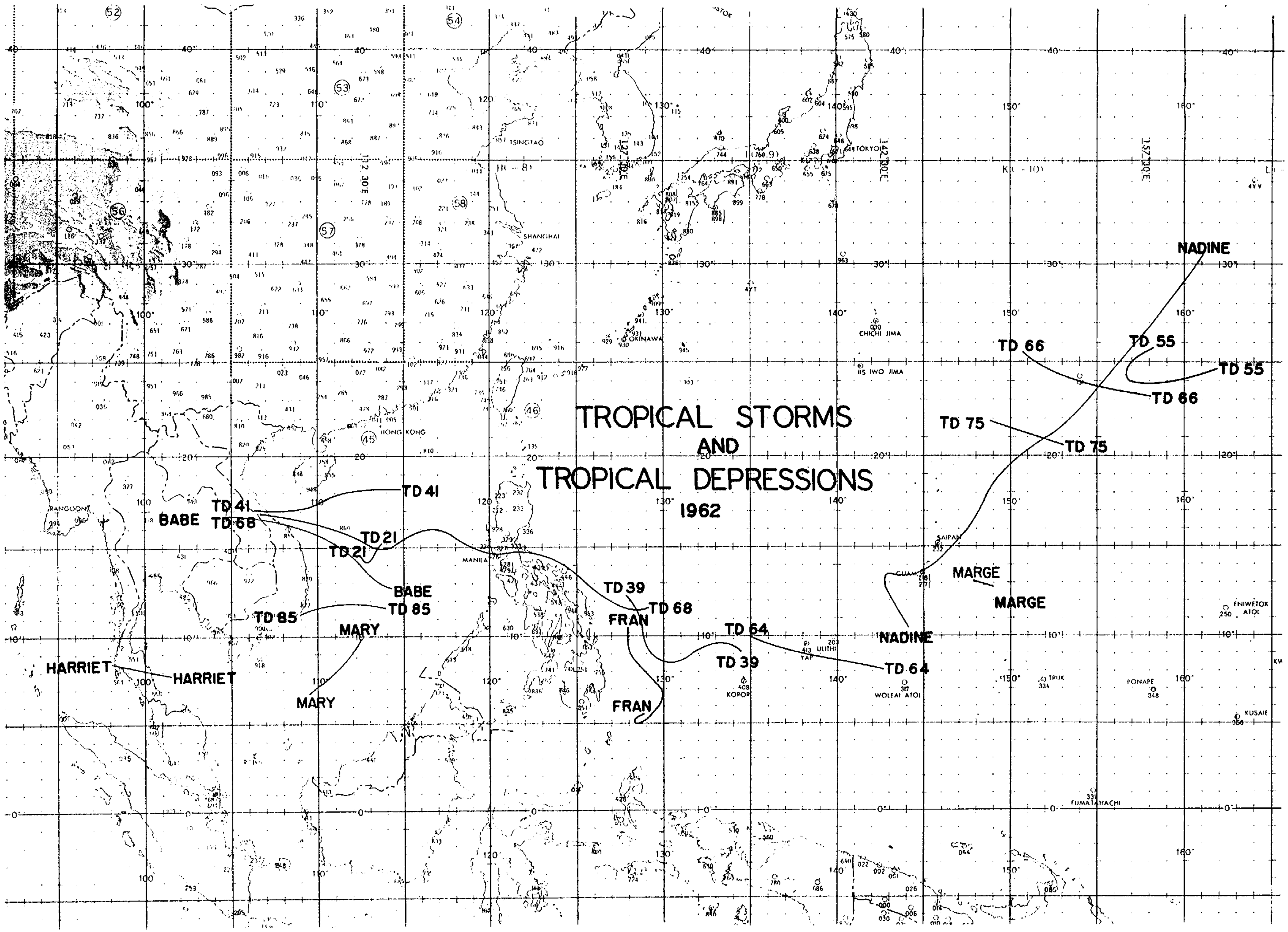
CYCLONE	*PERIOD
01. Investigation	01 Jan - 02 Jan
02. Tropical Storm FRAN	01 Feb - 06 Feb
03. Investigation	11 Feb - 13 Feb
04. Investigation	14 Feb - 17 Feb
05. Investigation	06 Mar - 07 Mar
06. Investigation	09 Mar - 10 Mar
13. Typhoon GEORGIA	16 Apr - 24 Apr
14. Investigation	28 Apr - 30 Apr
16. Investigation	07 May - 08 May
17. Typhoon HOPE	11 May - 22 May
18. Investigation	16 May - 17 May
21. Tropical Depression 21	21 May - 22 May
22. Typhoon IRIS	25 May - 30 May
24. Investigation	28 May - 31 May
26. Investigation	29 May - 30 May
29. Investigation	31 May - 02 Jun
34. Investigation	21 Jun - 28 Jun
36. Investigation	28 Jun - 04 Jul
37. Typhoon JOAN	04 Jul - 11 Jul
39. Tropical Depression 39	07 Jul - 15 Jul
41. Tropical Depression 41	10 Jul - 11 Jul
44. Typhoon KATE	18 Jul - 24 Jul
45. Typhoon LOUISE	19 Jul - 28 Jul
46. Typhoon NORA	22 Jul - 04 Aug
47. Tropical Storm MARGE	25 Jul - 29 Jul
48. Typhoon OPEL	29 Jul - 06 Aug
49. Investigation	30 Jul - 31 Jul
50. Tropical Depression 50 (JHWC Hawaii)	30 Jul - 03 Aug
51. Typhoon PATSY	05 Aug - 11 Aug
53. Typhoon SARAH	15 Aug - 22 Aug
54. Typhoon RUTH	13 Aug - 22 Aug
55. Tropical Depression 55	14 Aug - 15 Aug
56. Investigation	17 Aug - 18 Aug
58. Typhoon THELMA	20 Aug - 27 Aug
59. Typhoon WANDA	23 Aug - 01 Sep

TROPICAL CYCLONES OF 1962 (CONT'D)

CYCLONE	*PERIOD
60. Typhoon VERA	23 Aug - 28 Aug
61. Investigation	26 Aug - 28 Aug
62. Typhoon AMY	28 Aug - 08 Sep
63. Tropical Depression 63 (JHWC Hawaii)	01 Sep
64. Tropical Depression 64	03 Sep - 07 Sep
65. Typhoon CARLA	15 Sep - 23 Sep
66. Tropical Depression 66	11 Sep - 15 Sep
67. Tropical Storm BABE	13 Sep - 17 Sep
68. Tropical Depression 68	22 Sep - 27 Sep
69. Typhoon DINAH	25 Sep - 04 Oct
72. Typhoon FREDA	28 Sep - 10 Oct
73. Typhoon EMMA	01 Oct - 11 Oct
74. Typhoon GILDA	19 Oct - 30 Oct
75. Tropical Depression 75	20 Oct - 22 Oct
76. Typhoon IVY	28 Oct - 29 Oct
78. Tropical Storm HARRIET	25 Oct - 26 Oct
79. Investigation	26 Oct - 27 Oct
81. Typhoon JEAN	03 Nov - 12 Nov
84. Typhoon KAREN	07 Nov - 18 Nov
85. Tropical Depression 85	18 Nov - 20 Nov
86. Typhoon LUCY	24 Nov - 01 Dec
89. Tropical Storm MARY	01 Dec - 03 Dec
90. Tropical Storm NADINE	03 Dec - 10 Dec

* The period shown covers the period from the date the cyclone was first assigned a cyclone number until the final warning was issued, or if no warnings were issued, the date the cyclone dissipated.

Note: The missing numbers were assigned to major easterly waves that did not reach the cyclone stage.


TROPICAL STORMS
AND
TROPICAL DEPRESSIONS
1962
NADINE
TD 55
TD 66
TD 75
TD 41
TD 68
BABE
TD 21
TD 85
MARY
HARRIET
TD 39
FRAN
TD 64
MARGE
SHANGHAI
TSINGTAO
OKINAWA
CHICHI JIMA
IWO JIMA
HONG KONG
MANILA
RANGOON
SAIPAN
GUAM
YAP
ULITHI
KOROR
WOLEAI ATOL
TRUK
PONAPE
KUSAIE
ENIWETOK ATOL
TOKYO

TROPICAL STORMS 1962
POSITION DATA

TROPICAL STORM FRAN
02 FEB-06 FEB

DTG	LAT	LONG	DTG	LAT	LONG
020600Z	05.5N	128.9E	041200Z	07.5N	129.5E
021200Z	05.4N	128.8E	041800Z	07.8N	129.2E
021800Z	05.3N	128.6E	050000Z	08.2N	128.8E
030000Z	05.3N	128.5E	050600Z	08.5N	128.5E
030600Z	05.0N	128.5E	051200Z	09.0N	128.2E
031200Z	05.1N	128.9E	051800Z	09.5N	128.1E
031800Z	05.7N	129.6E	060000Z	10.0N	128.0E
040000Z	06.5N	130.0E	060600Z	10.5N	128.0E
040600Z	07.0N	129.9E			

TROPICAL STORM MARGE
28 JUL-29 JUL

DTG	LAT	LONG	DTG	LAT	LONG
280600Z	12.8N	148.9E	290000Z	13.0N	148.2E
281200Z	12.8N	148.7E	290600Z	13.1N	147.9E
281800Z	12.9N	148.4E			

TROPICAL STORM BABE
14 SEP-17 SEP

DTG	LAT	LONG	DTG	LAT	LONG
140000Z	12.7N	114.4E	151800Z	15.6N	110.2E
140600Z	12.9N	113.8E	160000Z	16.0N	109.3E
141200Z	13.2N	113.2E	160600Z	16.3N	108.1E
141800Z	13.7N	112.8E	161200Z	16.5N	107.0E
150000Z	14.2N	112.3E	161800Z	16.6N	105.8E
150600Z	14.7N	111.7E	170000Z	16.6N	104.8E
151200Z	15.2N	111.0E			

TROPICAL STORM HARRIET
25 OCT-26 OCT

DTG	LAT	LONG	DTG	LAT	LONG
251200Z	07.9N	101.5E	260600Z	DISSIPATED	
251800Z	08.1N	99.8E	261200Z	DISSIPATED	
260000Z	08.4N	98.1E			

TROPICAL STORM MARY
01 DEC-03 DEC

DTG	LAT	LONG	DTG	LAT	LONG
011200Z	09.8N	112.4E	021200Z	08.2N	111.4E
011800Z	09.4N	112.3E	021800Z	07.8N	110.9E
020000Z	09.1N	112.1E	030000Z	07.3N	110.3E
020600Z	08.7N	111.9E	030600Z	06.8N	109.5E

TROPICAL STORM NADINE
06 DEC-10 DEC

DTG	LAT	LONG	DTG	LAT	LONG
061200Z	10.4N	144.2E	081200Z	14.4N	146.0E
061800Z	11.3N	143.6E	081800Z	15.9N	147.4E
070000Z	12.0N	143.2E	090000Z	17.7N	148.5E
070600Z	12.8N	142.8E	090600Z	19.6N	150.1E
071200Z	13.4N	142.8E	091200Z	21.2N	152.3E
071800Z	13.4N	143.4E	091800Z	23.1N	154.6E
080000Z	13.4N	144.1E	100000Z	26.5N	157.9E
080600Z	13.6N	144.9E	100600Z	30.5N	161.2E

TROPICAL DEPRESSIONS 1962
POSITION DATA

TROPICAL DEPRESSION TWO ONE
21 MAY-22 MAY

DTG	LAT	LONG	DTG	LAT	LONG
210600Z	15.1N	113.7E	220600Z	14.2N	113.2E
211200Z	14.8N	113.5E	221200Z	14.0N	112.9E
211800Z	14.6N	113.4E	221800Z	14.3N	112.5E
220000Z	14.4N	113.3E			

TROPICAL DEPRESSION THREE NINE
08 JUL-12 JUL

DTG	LAT	LONG	DTG	LAT	LONG
080600Z	09.0N	134.5E	101200Z	08.8N	129.3E
081200Z	09.2N	134.3E	101800Z	09.1N	129.1E
081800Z	09.4N	133.9E	110000Z	09.5N	129.0E
090000Z	09.5N	133.3E	110600Z	10.0N	128.9E
090600Z	09.3N	132.5E	111200Z	10.7N	128.7E
091200Z	08.9N	131.6E	111800Z	11.3N	128.5E
091800Z	08.4N	130.8E	120000Z	11.8N	128.3E
100000Z	08.5N	129.9E	120600Z	12.2N	127.9E
100600Z	08.7N	129.6E			

TROPICAL DEPRESSION FOUR ONE
10 JUL-11 JUL

DTG	LAT	LONG	DTG	LAT	LONG
101200Z	18.1N	114.8E	110600Z	17.1N	109.9E
101800Z	18.2N	113.5E	111200Z	16.9N	108.0E
110000Z	17.9N	111.7E	111800Z	16.9N	106.4E

TROPICAL DEPRESSION FIVE FIVE
14 AUG-15 AUG

DTG	LAT	LONG	DTG	LAT	LONG
140000Z	24.8N	161.9E	141800Z	24.1N	156.8E
140600Z	24.4N	160.0E	150000Z	25.1N	157.0E
141200Z	24.0N	158.3E	150600Z	25.9N	158.1E

TROPICAL DEPRESSION SIX FOUR
05 SEP-06 SEP

DTG	LAT	LONG	DTG	LAT	LONG
050600Z	08.1N	142.8E	060000Z	09.1N	137.4E
051200Z	08.4N	140.9E	060600Z	09.4N	136.1E
051800Z	08.7N	139.2E	061200Z	10.0N	135.0E

TROPICAL DEPRESSION SIX SIX
12 SEP-14 SEP

DTG	LAT	LONG	DTG	LAT	LONG
121800Z	23.2N	158.1E	131800Z	24.2N	153.7E
130000Z	23.2N	157.4E	140000Z	24.8N	152.2E
130600Z	23.4N	156.5E	140600Z	25.6N	150.7E
131200Z	23.6N	155.3E			

TROPICAL DEPRESSION SIX EIGHT
22 SEP-27 SEP

DTG	LAT	LONG	DTG	LAT	LONG
221800Z	11.5N	129.2E	250600Z	15.4N	118.0E
230000Z	11.4N	128.4E	251200Z	15.9N	116.3E
230600Z	11.6N	127.3E	251800Z	15.3N	115.1E
231200Z	12.3N	126.4E	260000Z	14.8N	114.1E
231800Z	13.1N	125.4E	260600Z	15.1N	112.8E
240000Z	13.9N	124.2E	261200Z	15.7N	111.1E
240600Z	14.4N	123.1E	261800Z	16.2N	109.5E
241200Z	14.5N	122.1E	270000Z	16.5N	108.0E
241800Z	14.5N	120.9E	270600Z	16.7N	106.7E
250000Z	14.7N	119.3E			

TROPICAL DEPRESSION SEVEN FIVE
21 OCT-22 OCT

DTG	LAT	LONG	DTG	LAT	LONG
210600Z	20.6N	153.1E	220000Z	21.6N	149.8E
211200Z	20.9N	152.0E	220600Z	21.9N	148.8E
211800Z	21.3N	150.9E			

TROPICAL DEPRESSION EIGHT FIVE
18 NOV-20 NOV

DTG	LAT	LONG	DTG	LAT	LONG
181200Z	11.5N	114.0E	191200Z	11.5N	110.7E
181800Z	11.6N	113.2E	191800Z	11.4N	109.8E
190000Z	11.6N	112.4E	200000Z	11.0N	109.0E
190600Z	11.6N	111.6E			

POSITION DATA FOR TROPICAL DEPRESSION WARNINGS ISSUED BY
JOINT HURRICANE WARNING CENTER, HAWAII

TROPICAL DEPRESSION FIVE ZERO
30 JUL-03 AUG

DTG	LAT	LONG	DTG	LAT	LONG
300600Z	10.5N	161.9W	010600Z	13.3N	171.0W
301200Z	11.0N	163.0W	011200Z	13.5N	171.9W
301800Z	11.3N	164.4W	011800Z	13.8N	173.0W
310000Z	11.7N	165.6W	020000Z	13.9N	174.0W
310600Z	12.1N	167.0W	020600Z	13.9N	175.0W
311200Z	12.5N	168.0W	021200Z	14.0N	176.0W
311800Z	12.9N	168.9W	021800Z	14.0N	177.0W
010000Z	13.1N	169.9W	030000Z	DISSIPATED	

TROPICAL DEPRESSION SIX THREE
1 SEP

DTG	LAT	LONG	DTG	LAT	LONG
010000Z	16.5N	149.0W	011200Z	16.5N	151.0W
010600Z	16.5N	150.0W			

1962 TYPHOON FORECAST ERRORS
(IN MI)

	24 HR FORECASTS		48 HR FORECASTS	
TYPHOON	NO. OF CASES	MEAN ERROR	NO. OF CASES	MEAN ERROR
GEORGIA	25	269.7	21	500.5
HOPE	22	145.8	18	316.1
IRIS	6	224.2	4	429.0
JOAN	13	114.5	9	314.2
KATE	16	200.2	12	405.4
LOUISE	28	143.7	24	326.0
NORA	20	171.4	16	243.1
OPEL	14	138.7	10	181.1
PATSY	13	113.1	9	175.8
RUTH	32	115.9	28	311.0
SARAH	27	116.6	23	276.7
THELMA	22	112.5	18	147.8
VERA	9	134.8	5	338.8
WANDA	15	140.6	11	222.0
AMY	31	132.1	29	234.4
CARLA	7	152.3	3	297.0
DINAH	18	131.2	14	343.1
EMMA	36	163.3	32	364.4
FREDA	21	136.6	17	268.1
GILDA	31	158.0	27	330.2
IVY	3	146.7	0	--
JEAN	22	147.3	18	262.9
KAREN	38	104.6	34	173.9
LUCY	20	110.2	16	220.7

AVERAGE ERROR-24 HR FORECASTS (489 CASES)..........144.2
AVERAGE ERROR-48 HR FORECASTS (398 CASES)..........287.4